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EXAMINER	
ODOM, CURTIS B	

ART UNIT	PAPER NUMBER
2634	

DATE MAILED: 09/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/728,351	BERGGREN ET AL.	
	Examiner	Art Unit	
	Curtis B. Odom	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-13 and 16-32* is/are rejected.

7)☒ Claim(s) *5,6,14 and 15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 November 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because each element of each figure is suggested to be labeled (see Fig. 1, element 17; Fig. 2, elements 17 and 220; and Fig. 6, elements 660a, 660b, 17, and 220). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The abstract of the disclosure is objected to because in line 17, "fedback" is suggested to be changed to "fed back". Correction is required. See MPEP § 608.01(b).

Claim Objections

3. Claims 10 and 28 are objected to because of the following informalities:

a. In claim 10, the phrase "the delay element" is suggested to be changed to "a delay element".

b. In claim 28, the phrase "delaying means" is suggested to be changed to "first delaying means".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-3, 16, 17, 20, 21, 24-26, and 28-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Cochran (U. S. Patent No. 6, 363, 124).

Regarding claim 1, Cochran discloses a phase noise tracker (Fig. 2), comprising:

a first rotator (Fig. 2, block 58, column 4, line 54-column 5, line 7) comprising a signal input, a phase control input, and an output;

a feedback loop (Fig. 2, block 56, column 4, line 54-column 5, line 7) comprising an input coupled to the output of the first rotator and an output;

a delay element (Fig. 2, block 82, column 6, line 58-column 7, line 19) comprising an input coupled to the signal input of the first rotator and an output;

a second rotator (Fig. 2, block 84, column 7, lines 7-28) comprising a signal input coupled to the output of the delay element, a phase control input, and an output; and

where the output of the feedback loop is coupled to the phase control input of the first rotator and the phase control input of the second rotator (Fig. 2, block 56, column 6, line 15-column 7, line 28).

Regarding claim 2, which inherits the limitations of claim 1, Cochran discloses the feedback loop further comprises a phase error detector comprising an input coupled to the output of the first rotator and an output (Fig. 2, block 64, column 4, line 54-column 5, line 7).

Regarding claim 3, which inherits the limitations of claim 2, Cochran discloses the feedback loop further comprises a lowpass filter comprising an input coupled to the output of the phase error detector and an output coupled to the phase control input of the first rotator and the phase control input of the second rotator (Fig. 2, block 68, column 4, line 54-column 5, line 7).

Regarding claim 16, Cochran discloses a DTV receiver comprising the phase noise tracker of claim 1, (column 3, lines 58-60), wherein a DTV receiver is a digital communications receiver.

Regarding claim 17, Cochran discloses a cable modem comprising the phase noise tracker of claim 1, (column 3, lines 58-60), wherein a DTV receiver is a digital communications receiver.

Regarding claim 20, Cochran discloses a method of tracking a phase noise of an input signal, comprising:

rotating (Fig. 2, block 58, column 4, line 54-column 5, line 7) the phase of the input signal;

feeding (Fig. 2, block 56, column 4, line 54-column 5, line 7) the phase rotated input signal to an input of a feedback loop;

delaying (Fig. 2, block 82, column 6, line 58-column 7, line 19) the input signal;

rotating (Fig. 2, block 84, column 7, lines 7-28) the phase of the delayed input signal; and

controlling (Fig. 2, block 56, column 6, line 15-column 7, line 28) the steps of rotating the phase of the input signal and the phase of the delayed input signal using an output of the feedback loop.

Regarding claim 21, which inherits the limitations of claim 20, Cochran further discloses transforming an incoming signal into the input signal, wherein the input signal is a complex signal comprising an I (in-phase) component and a Q (quadrature) component (Fig. 2, block 44, column 4, lines 6-16).

Regarding claim 24, Cochran discloses a method of tracking a phase noise of an input signal, comprising:

rotating (Fig. 2, block 58, column 4, line 54-column 5, line 7) the phase of the input signal;

estimating (Fig. 2, block 64, column 4, line 54-column 5, line 7) at least one phase error value for the phase rotated input signal;

feeding (Fig. 2, block 68, column 4, line 54-column 5, line 7) the at least one estimated phase error value to an input of a filter;

delaying (Fig. 2, block 82, column 6, line 58-column 7, line 19) the input signal;

rotating (Fig. 2, block 84, column 7, lines 7-28) the phase of the delayed input signal; and

controlling (Fig. 2, block 56, column 6, line 15-column 7, line 28) the steps of rotating the phase of the input signal and the phase of the delayed input signal by using an output of the filter.

Regarding claim 25, which inherits the limitations of claim 24, Cochran discloses the filter includes a low pass filter (Fig. 2, block 68, column 4, line 54-column 5, line 7), wherein the loop filter is a second order low-pass filter (column 6, lines 20-24 and column 8, lines 36-42).

Regarding claim 26, which inherits the limitations of claim 24, Cochran discloses transforming an incoming signal into the input signal, wherein the input signal is a complex signal comprising an I (in-phase) component 20 and a Q (quadrature) component (Fig. 2, block 44, column 4, lines 6-16).

Regarding claims 28-30, the claimed apparatus includes features corresponding to subject matter mentioned in the above rejection of claims 1-3, which is applicable hereto.

Regarding claim 31, which inherits the limitations of claim 28, Cochran further discloses a transforming means for transforming an incoming signal into the input signal, wherein the input signal is a complex signal comprising an I (in-phase) component and a Q (quadrature) component (Fig. 2, block 44, column 4, lines 6-16).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 4, 7, 8, 11-13, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cochran (U. S. Patent No. 6, 363, 124).

Regarding claim 4, which inherits the limitations of claim 3, Cochran does not disclose the low-pass filter comprises:

an adder comprising a first input coupled to the output of the phase error detector, a second input, and an output;

a multiplier comprising an input coupled to the output of the adder and an output; and

a second delay element comprising an input coupled to the output of the multiplier and an output coupled to the second input of the adder.

However, it would have been obvious to one skilled in the art at the time the invention was made that these components configured in the manner described above create an integrator. It is common in the art to refer to an integrator as a low pass filter and vice versa. Thus, it would have also been obvious to one skilled in the art at the time the invention was made that since the low pass filter of Cochran also comprises of an integrator (Fig. 5, block 96), that claim 4 does not constitute patentability.

Regarding claims 7 and 8, which inherits the limitations of claim 1, Cochran does not disclose a Hilbert filter comprising an input and an output coupled to the signal input of the first rotator wherein the Hilbert filter transforms an incoming 8-VSB signal at its input into a complex signal at its output, the complex signal comprising an I component and a Q component.

However, Cochran does disclose a mixer (Fig. 2, block 44, column 4, lines 6-16) comprising an input and an output coupled to the signal input of the first rotator wherein the mixer transforms an incoming RF signal at its input into a complex signal at its output, the complex signal comprising an I component and a Q component (I and Q components are the two orthogonal components of a signal). VSB signals are a type of RF signal transmitted and received by a plurality of communication devices. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that in this instance, the mixer is a functional equivalent of the Hilbert filter since it produces the complex signal comprising an I component and a Q component from an incoming signal. A Hilbert filter could have been implemented in place of the mixer without changing the functionality of the receiver. Thus, claims 7 and 8, do not constitute patentability.

Regarding claim 11, which inherits the limitations of claim 7, Cochran discloses the feedback loop further comprises a phase error detector comprising an input coupled to the output of the first rotator and an output (Fig. 2, block 64, column 4, line 54-column 5, line 7).

Regarding claim 12, which inherits the limitations of claim 11, Cochran discloses the feedback loop further comprises a low pass filter comprising an input coupled to the output of the phase error detector and an output coupled to the phase control input of the first rotator and the phase control input of the second rotator (Fig. 2, block 68, column 4, line 54-column 5, line 7).

Regarding claim 13, which inherits the limitations of claim 12, Cochran does not disclose the low-pass filter comprises:

an adder comprising a first input coupled to the output of the phase error detector, a second input, and an output;

a multiplier comprising an input coupled to the output of the adder and an output; and

a second delay element comprising an input coupled to the output of the multiplier and an output coupled to the second input of the adder.

However, it would have been obvious to one skilled in the art at the time the invention was made that these components configured in the manner described above create an integrator. It is common in the art to refer to an integrator as a low pass filter and vice versa. Thus, it would have also been obvious to one skilled in the art at the time the invention was made that since the low pass filter of Cochran also comprises of an integrator (Fig. 5, block 96), that claim 4 does not constitute patentability.

Regarding claim 18, Cochran discloses a DTV receiver comprising the phase noise tracker of claim 7, (column 3, lines 58-60), wherein a DTV receiver is a digital communications receiver.

Regarding claim 19, Cochran discloses a cable modem comprising the phase noise tracker of claim 7, (column 3, lines 58-60), wherein a DTV receiver is a digital communications receiver.

8. Claims 9, 10, 22, 23, 27, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cochran (U. S. Patent No. 6, 363, 124) in view of Wang (U. S. Patent No. 6, 356, 598).

Regarding claim 9, which inherits the limitations of claim 8, Cochran discloses a mixer (Fig. 2, block 44, column 4, lines 6-16) comprising an input and an output coupled to the signal input of the first rotator wherein the mixer transforms an incoming RF signal at its input into a complex signal at its output, the complex signal comprising an I component and a Q component (I and Q components are the two orthogonal components of a signal). VSB signals are a type of RF signal transmitted and received by a plurality of communication devices. However, Cochran does not disclose that a Hilbert filter produces the I component of the complex signal by delaying the 8-VSB signal and produces the Q component of the complex signal by approximating a Hilbert transform of the 8-VSB signal.

However, Wang discloses an RF receiver comprising of a Hilbert filter producing the Q component of the complex signal by approximating a Hilbert transform of an 8-VSB signal and producing I component of the complex signal by delaying the incoming 8-VSB signal (Fig. 3, blocks 320 and 322, column 3, lies 60-67). Therefore it would have been obvious to one of

ordinary skill in the art at the time the invention was made to replace the mixer of Cochran with the Hilbert filter and delay of Wang to produce I and Q signal components of the VSB signal since the I and Q components of a VSB modulated signal are Hilbert transforms of each other. This would result in reduced complexity and circuitry by only having to implement a single filter and delay to obtain the I and Q signal components rather than implementing a plurality of multipliers and waveform circuits (as is the case with the mixers and oscillating circuits) to produce the signal components.

Regarding claim 10, which inherits the limitations of claim 9, Cochran and Wang do not disclose the delay element introduces a delay of about 50 taps. However, Wang does disclose the delay matches the delay of processing performed by the Hilbert filter. Therefore, it would have been obvious to one skilled in the art at the time the invention was made that if the delay of the Hilbert filter were 50 taps then 50 taps would be the delay of the delay element. The delay would depend on the design of the Hilbert filter. Thus, claim 10 is deemed a design choice and does not constitute patentability.

Regarding claims 22, 23, 27, and 32, Cochran discloses transforming an incoming signal into the input signal, wherein the input signal is a complex signal comprising an I (in-phase) component and a Q (quadrature) component (Fig. 2, block 44, column 4, lines 6-16). VSB signals are a type of RF signal transmitted and received by a plurality of communication devices. Cochran does not disclose producing the I component of the input signal by delaying the incoming (8-VSB) signal and producing the Q component of the incoming (8-VSB) signal by approximating a Hilbert transform of the incoming (8-VSB) signal.

However, Wang discloses an RF receiver comprising of a Hilbert filter producing the Q component of the complex signal by approximating a Hilbert transform of an 8-VSB signal and producing I component of the complex signal by delaying the incoming 8-VSB signal (Fig. 3, blocks 320 and 322, column 3, lies 60-67). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Cochran using the Hilbert filter and delay of Wang to produce I and Q signal components of the VSB signal since the I and Q components of a VSB modulated signal are Hilbert transforms of each other. This would result in reduced complexity and circuitry by only having to implement a single filter and delay to obtain the I and Q signal components rather than implementing a plurality of multipliers and waveform circuits (as is the case with the mixers and oscillating circuits) to produce the signal components.

Allowable Subject Matter

9. Claims 5, 6, 14, and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Jiang et al. (U. S. Patent No. 6, 445, 752) discloses an apparatus for tracking phase noise including the use of a Hilbert transform.

Hoshuyama (U. S. Patent No. 5, 627, 799) discloses an integrator comprising of a multiplier, adder, and delay.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 571-272-3046. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Curtis Odom
September 22, 2004

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